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METHODS OF REGIONAL FORECASTING

The need for seeing into the future is probably as old as mankind. In spite of notorious experiments, methodically well-founded economic-social forecasts have only been made since the middle of the 20th century. The objective of forecasts is to get to know the expected medium and long-term tendencies (collectively: vision), quantify them as far as possible, and incorporate them into plans. It is important to emphasise that forecasts are designed to describe the situations that can be expected and not to collect 'dreams'. Forecasts at the same time are not magic wands which can draw exclusively positive tendencies. Therefore forecasts have the essential task of taking expected negative tendencies into account.

Потребность прогнозирования будущего столь же стара как человечество. Несмотря на печально известные эксперименты, систематически экономическо-социальные предсказания были сделаны начиная с середины 20-го столетия. Задача предсказаний - необходимо знать длительную тенденцию изменения возможностей, которая и должна быть в основе планирования. В то же время прогнозы – это не волшебная палочка, которая может представлять исключительно положительную тенденцию. Поэтому предсказания имеют существенную задачу уменьшить возможное наличие негативных тенденций в экономике.

Methodology of forecasting. The past decades have seen a substantial stock of forecasting tools (forecasting based on opinion, based on time series) come into being, and a number of organisations specialised in their preparation established (www.sfutures.com), which perform both global and national and regional analyses.^{9/} Forecasting methods can be put into two categories according to the methodology of regional forecasting (Figure 1).

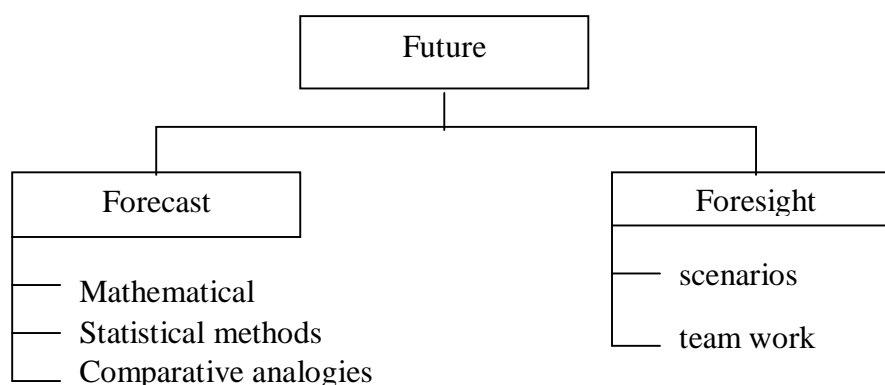


Figure 1 - Classification of forecasting methods (Source: author's compilation)

^{9/} E.g. ADAS experts elaborated 35 forecasts in respect of what changes can be expected in the world in the period between 20005 and 2040 in the following fields: environmental policy, waste management, climatic change, renewable energies, animal healthcare and welfare, sustainability, food industry, technology applications, agriculture and rural policy.

Home page: <http://www.spatialnorth.org/spatial-elanning-processes/the-spatialnorth-planning-wheel/vision-development/The%20World%20in/202040%20blue%20sky%2035%20ADAS.doc>.

The methodology of foresight is relatively new, the need (e.g. in connection with technical-technological tasks) was first formulated for an alternative formulation of the future in the 1990s. Forecast type methods can be used to present the trends of development and the vision derived from them, while the methods of foresight can be used to show an alternative model of the future. Forecast type projections make an attempt at objectivity, using mathematical-statistical methods and ex-post data to present the future (Table 1).

Table 1 - Features of futurology methods (Source: author's compilation)

Method	Most important features
Projective	Projects the tendencies of the past period into the future and attempts to draw conclusions.
Mathematical-statistical	Attempts to quantify events expected in the future by stating numerical relations.
Delphi	Attempts to explore the directions of changes and to determine the events to be expected as well as their chronological sequence by asking experts for their opinions in writing in several rounds, giving feedback on the opinions and correcting them. The expert opinions are collected by questionnaires using closed questions.
Comparative analogies	Draws conclusions from changes in regions with similar potentials (positions).
Scenario	Explores the logical connections between events and tendencies following each other, evaluates them and draws conclusions in 2-3 versions. A scenario has to give an answer as to what phenomena may appear as a result of the interventions and what steps are necessary for bringing about a given situation.

Forecasts built on time series do not take into account possible unexpected events and their reliability is largely affected by the length of time considered. A good illustration of this is Figure 2, which leads to starkly differing results on the basis of two identical time lengths but different intervals (1860-2004 and 1990-2004). These procedures, however, have the advantage that their methodology is elaborated and can be used in the form of algorithms (standard software is available for performing the calculations); and the results are easy to visualise and are reproducible. Foresight methods (striving for drawing complete visions of the future) depend on the interactive cooperation of experts (teams of experts). It follows that the reliability of the information thus compiled depends on the qualification, knowledge, recognition and last but not least the willingness of the experts to cooperate. Considering the advantages and disadvantages, a combined use of the normative and speculative method seems justified in the majority of cases.

As it can be seen from the above, forecasts cover a minimum of medium time length (min. 3-5 years) or a longer time length (5-25 years) as opposed to the analyses of market

trends, which examine a few months or at most one year.^{10/}

Possible directions of forecasts. Forecasts are intended to provide the foundations for the vision of the region and its system of objectives. In the course of the work, the starting points are provided by macro-economic forecasts (the expected growth rate of the national economy, the sectoral trends of growth, the tendencies of change in the use of the GDP, the development of investments, the directions of change of financial processes, national level demographic and social tendencies, etc.) (Figure 3).

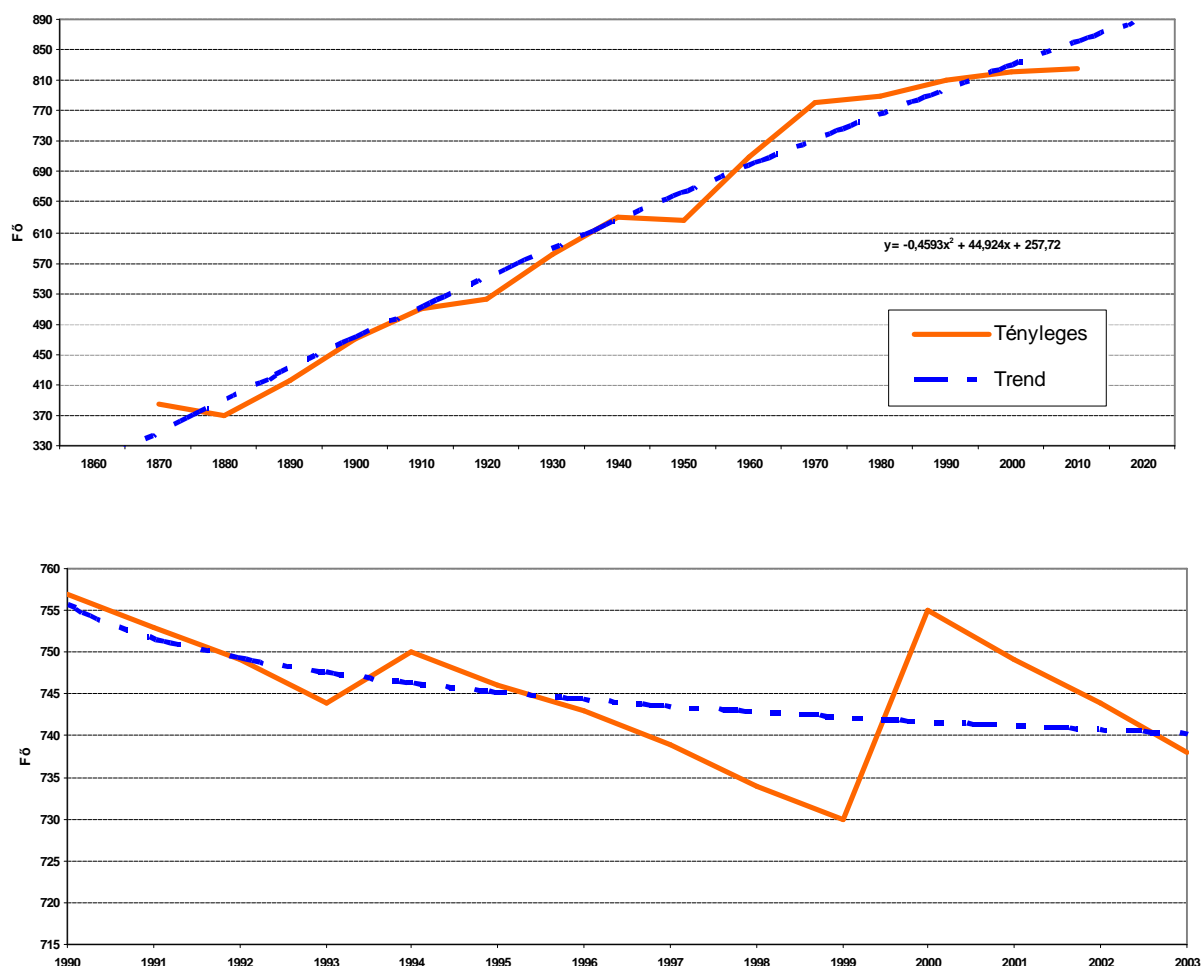


Figure 2. Tendencies in the change in the population of Borsod-Abaúj-Zemplén county for various periods (Source: author's compilation)

^{10/} Several economic research institutes are involved in forecasting market trends. Their examination methods are also different. E.g. the MKIK Economic and Enterprise Theory Institute (Gazdálkodási és Vállalkozásméleti Intézet GVI) asks the members of its company panel for answers to seven groups of questions for the purpose of compiling its short-term forecasts of business cycles, such as current business situation, business situation in the next six months, current profitability of the company, profitability of the company in the next six months, the expected volume of orders in the next six months, expected machinery investment volume as compared to the previous year, expected construction volume as compared to the previous year (<http://gvi.hu>). Based on the weighting of the numerical values given in answer, the individual business trend expectations of the respondents can be determined (km_i):

$$km_i = 0,1 * uhj_i + 0,2 * uhv_i + 0,1 * vjj_i + 0,2 * vjv_i + 0,2 * msv_i + 0,1 * bgv_i + 0,1 * bev_i.$$

The right-hand side of the equation includes the indicators considered in the calculation of the business trends. For an industry with a definite number of elements (n), the value of the indicator of business activity (KM) can be determined as the average of the corporate values:

$$KM_n = \frac{\sum_{i=1}^n km_i}{n}.$$

Beyond macro-economic forecasts (e.g. budget, inflation, incomes, GDP, etc.), regional level demographic, technical and technological, employment, transport, healthcare, education, social, etc. forecasts are needed.

Demographic forecasting calculations. Regional level demographic forecasts have perhaps one of the best elaborated processes in terms of methodology, as shown by the Hungarian (e.g. Háblicsek, 2007; Háblicsek/Tóth/Veres, 2005) and international literature (e.g. Hampel/Kunz/ Schanne/Wapler/Weyh, 2006; Hilbert/Mytze, 2002).

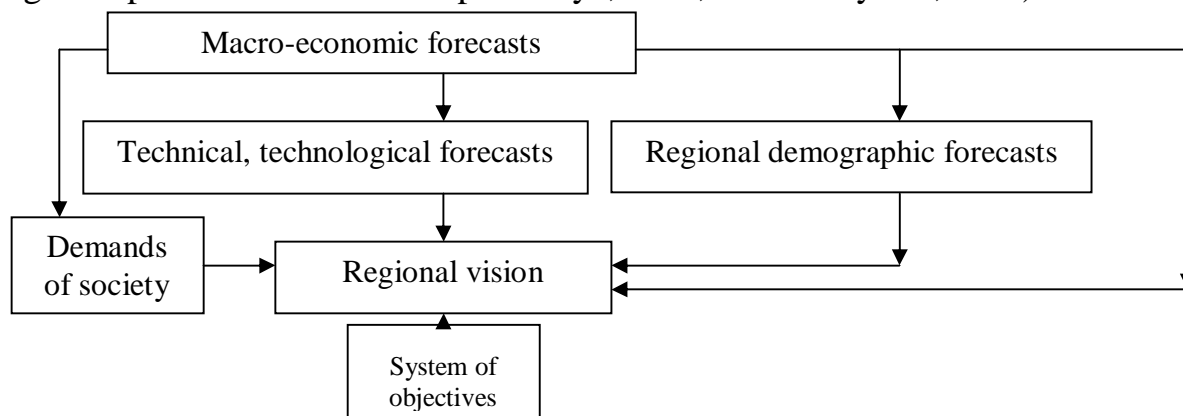


Figure 3. Logical process of developing a top-down vision and its system of objectives (Source: author's compilation)

The expected number of the population in the region (P) can be determined on the basis of births (Sz), deaths (H) and the migration balance (VE):

$$P = Sz - H + VE. \quad (1)$$

In the forecasting calculation of regional population there is a choice of three methods: bottom-up method, i.e. forecasting calculation can be done for a given region independent of the national data, in such cases the migration balance is interpreted separately (Figure 4/a); breaking down national level population forecasting calculation data into regional levels (Figure 4/b); multi-regional forecasting calculation (Figure 4/c).

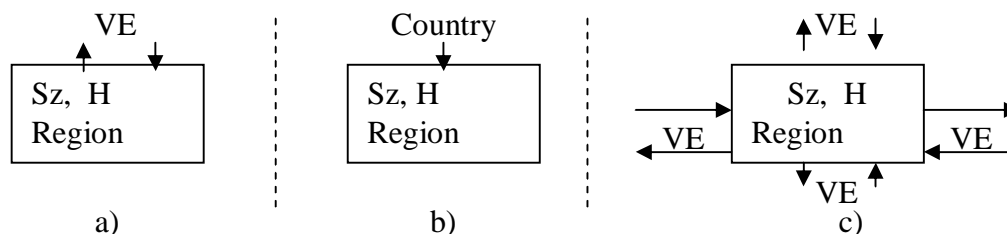


Figure 4 - Possible methods of population forecasting calculation

For population forecasting calculations (depending on the available demographic data) analytical demographic, constituent-system and econometric methods can be used (Balázs/Horváth, 1994; Eckey/Stock, 1996). The most important feature of analytical population forecasting calculation methods is that they determine (estimate) the change in

the total population of a region (calculated on the basis of referendum or other population data) by projecting and extrapolating the reproduction ratios. The simplest version is to assume an increase in the population of the region by arithmetic progression, when the initial population (L_0) increases by an annually identical actual increase (K); accordingly, after a time t the expected number of the population (L_t) is:

$$L_t = L_0 + Kt. \quad (2)$$

The population is a self-increasing variable, i.e. increases monotonously annually (thus assuming an increase in the population by geometric progression), the initial population will increase annually by the same natural reproduction ratio R ; and for the t -th period the expected number of the population is:

$$L_t = L_0(1+r)^t. \quad (3)$$

The relation only takes account of the natural increase and neglects the migration difference. If this difference is considerable, the geometric progression and its increase have to be corrected by its value. Both methods assume that the previous tendency to increase will not change in the future either. The rate of increase of the population, however, changes with time (e.g. in the long term the natural increase of the population changes according to the logistic curve). The regular and continuous collection and analysis of the data of phenomena of demographic changes has made it possible to make forecasts concerning the population on the basis of fertility and mortality rates, as well as of migration indices, i.e. the major elements of the demographic process. If the forecasts are made separately assuming the constancy of the rates of these processes (Bade F.J., 1999), the number of the longer living population is determined in the first stage of the calculations on the basis of the specific mortality rates by means of age-shift: the initial (currently living) population has to be broken down into groups by sex and age groups. Then deducing the number of dead ($q_x L_x^0$) according to the mortality rate (q_x) of the group (sex and age group specific) from the number of the individual groups at the beginning of the year (L_x^0) it is possible to determine the number of the population living on at the beginning of the next years (L_{x+1}^1).

$$L_{x+1}^1 = L_x^0 - (L_x^0 \cdot q_x) \quad (4)$$

In view of the fact that forecasts refer to longer periods, the age-shifts by sex and age group have to be performed for the given year. By summing the individual groups, it is possible to determine the number of population living on in the region. Since this calculation method is troublesome, in practice the on-living probabilities by group ($p_x = 1 - q_x$) are used instead of the mortality probabilities (q_x) (Geppert K., 1999). By using the mortality laws as described above it is only possible to estimate the expected number of the existing age groups in time t and composition by sex and age group, and the births in the meantime or the migration differences are neglected. Forecasting the number of births

is more difficult, for it is not connected to a single criterion as closely as death is connected to age. The development of fertility is affected by several demographic factors (beyond the age composition, the marital status of women in childbearing age, the number of children in a family, etc.). In spite of that, generally the age-specific number of births of women is used for forecasting the number of births. The number of expected (projected) births for a year (N_t) can be determined using the number of age groups of women (L_x) and the related birth rates (f_x):

$$N_t = \sum_{x=15}^{49} L_x \cdot f_x \cdot \quad (5)$$

Births are calculated in practice using the annual average of the population; therefore it is customary to calculate the age-specific rates for the subsequent age groups:

$$[(L_x^1 + L_{x+1}^{t+1}) \cdot 0,5]. \quad (6)$$

The forecast of the number of births is also for several years, and the calculations are to be performed accordingly with consideration of the number of deaths and age-shifts. In forecasting the actual population it is expedient to take the effect of migration (V) also into consideration, for it exerts an impact on the number and composition of the population to some extent.

$$L_{x+1} = L_x \cdot p_x \pm V_x \quad (7)$$

Demographers also make the on-living and expected birth rate calculations for the migration differences (Heckmann, 1997). The component methods of population forecasts are used to perform age-shift in the various groups by sex and age groups of the known initial population on the basis of presumed mortality rates until the time of the forecast in order to determine the number of on-living population. The thus forecast child-bearing age women population and the presumed age-specific fertility rates are used to determine the number of the new generation and according to the relevant mortality probabilities the age-shift is performed also regarding them until the time in question. Finally the presumed elements of migration are incorporated into the calculation process, taking the fertility and mortality rates of the migrants also into consideration (Figure 5).

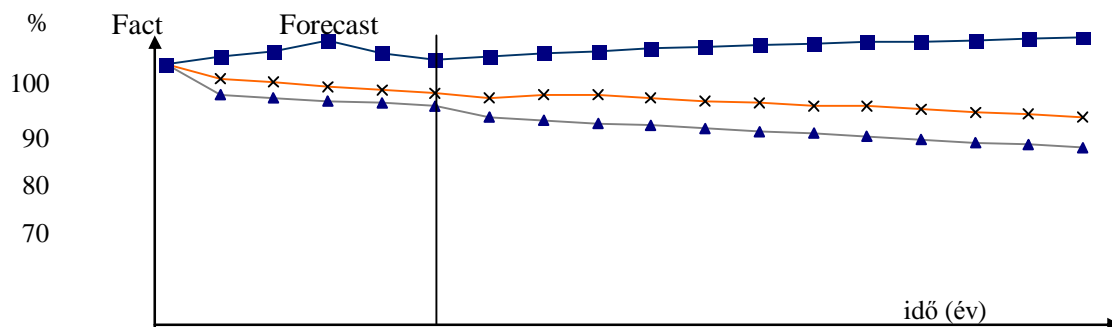


Figure 5 - Changes in the expected population number of different regions (*Source: author's compilation*)

Technology forecasts. The Delphi method is mostly used for forecasting technical, technological changes expected in the technical fields (e.g. Aichholzer, 2002.) for the various areas (e.g. raw materials, communication technologies, the chemical industry, etc.).^{11/}

Formulating a vision, setting the objectives. Strategy is a means of creating a future, strategy focuses on man and the related welfare effects. No regional strategy can achieve its objective which focuses exclusively on economic development and growth and wishes to express it by a single index, the GDP. Namely the GDP takes into consideration only the factors to which a flow of money is connected and thus it is not concerned with negative impacts affecting people (e.g. damage to the environment).

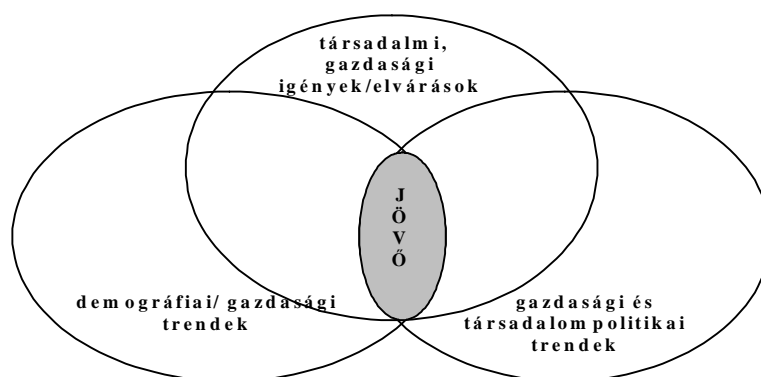


Figure 6 - Factors determining mezo-level vision (Source: author's own compilation)

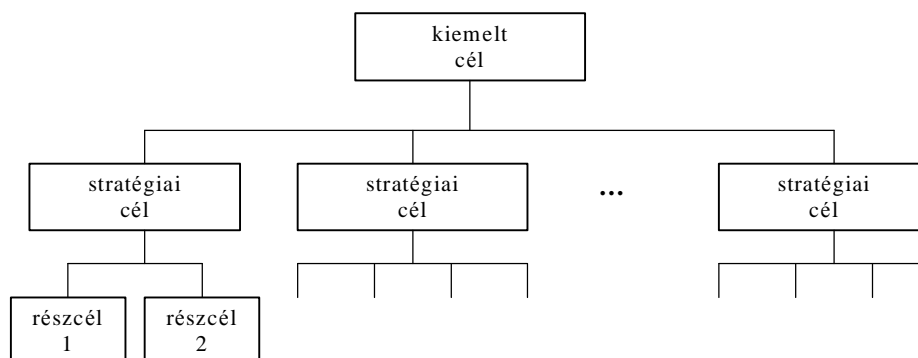


Figure 7 - Example for target-tree structure (Source: author's compilation)

Moreover, the GDP does not make a difference between flows of money that improve and those that vitiate conditions of living (e.g. it takes the expenditure on reducing crime or on the subsequent elimination of damage to the environment into account as positive). The appropriate regional strategy serves no single (partial) objective, but harmonises the opportunities and limitations with a complex system of objectives (Figure 6).

Considering the map of problems (the collection of problem pyramids) available as a

^{11/} A number of institutes are specialised in making technical, technological forecasts around the world, e.g. National Institute of Science and Technology Policy, Japan, Institut für Technikfolgenabschätzung und Systemanalyse Helmholtz-Gemeinschaft, etc.); and several periodicals and journals are concerned with the issue, e.g.: Technikfolgenabschätzung-Theorie und Praxis, International Journal of Technology Management, etc.

result of the situation analysis, it becomes possible to formulate the system of objectives of the development, the set of objectives in line with the problem pyramids. It is expedient to break down and plot the structure of the major and minor objectives in the form of a tree graph (Figure 7).

In breaking down the objectives, the process has to result in the lower level objectives contributing to achieving the higher level ones. The objectives have to be realised collectively in the long term, in fact none of them can be omitted, they constitute the fundamental priorities of the development concept plan and mostly supplement and do not replace each other, although at the same time they also carry contradictions. Creating harmony and proportions between the implementation of the objectives and development directions is a requirement of priority importance of the development concept plan. Regional development objectives have to fit the objectives of the national economy directly or indirectly (Figure 8).

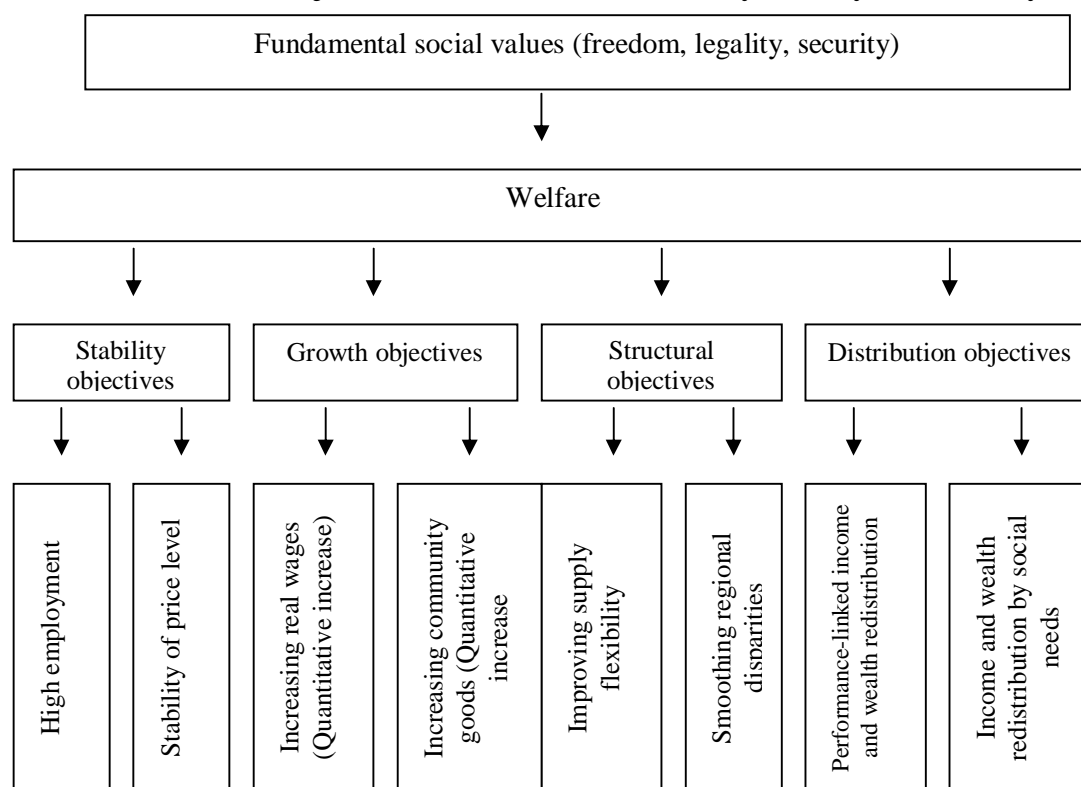


Figure 8. Macro-level social and economic policy objectives (Source: author's compilation)

The individual branches of the target tree can be assigned weight numbers expressing to what extent the particular objective component contributes to achieving the higher level objective.

The system of objectives can be structured by functional aspects (Table 2).

a) The *objectives of economic development* are designed to serve the growth and development of the economy of a region. The 'objectives of economic development' is a collective term, a set of partial objectives in a looser/closer relation with each other. Among

the objectives of economic development promoting the rise of a region *capital* is of priority significance. Among other things, an increase in capital accumulation: exerts a stimulating influence on investments and contributes to creating jobs and demand; increases output and the ultimate supply; increases comparative real wages, which in turn has a beneficial effect on the increase of demand.

Table 2 - An example for the structure of strategic and partial objectives (*Source: author's compilation*)

Strategic objectives	Partial objectives
Economic development	intensifying capital involvement /mobility re-structuring the economy decreasing economic disparities increasing enterprising intensity establishing partnership (integration) relations establishing supplier systems, clusters improving the technology absorption capacity increasing the added value settlement of knowledge-intensive industries developing the education infrastructure developing production infrastructure (industrial parks, enterprise zones) developing e-economy and e-public administration developing the logistics infrastructure developing regional accessibility, etc.
Improving the healthcare and social situation	improving employment, reducing unemployment developing the social institution network lengthening human life, etc.
Improving the demographic situation	creating a balance in migration increasing life expectancy improving the willingness to have children, etc.
Improving the labour market situation	encouraging training and retraining decreasing the rate of unqualified population of working age, etc.
Strengthening regional identity	preserving cultural and historical values supporting the activities of civil organisations strengthening regional identity, etc.
Improving the living conditions	developing a conscious waste management protection against natural catastrophes improving the state of health of the population social integration of groups at disadvantage, etc.

The *competitive situation* of a region is a complex idea. In an economic sense it characterises the positions the region has reached within and outside of the national economy as well as the interest in the region (market demand). The dynamic relation between *the economic structure* and economic development entails a change in the proportions of the primary, secondary and tertiary sectors. Its optimisation involves the solution of considerable economic-social tasks. The economies of regions are characterised by specific regularities. A disharmony within a region or emerging in the system of relations of a region leads to differences in development and/or growth. *Disparities* appear not only in the economy, but in the quality of life, in its healthcare and cultural conditions, in the education and cultural standards of those living in the region, and in the 'psychic climate' of the region as well. Therefore decreasing and eliminating the disparities is one of the most frequently formulated objectives. The obstacles to development are closely connected to each other, as it is shown

by the example of the vicious circle of backwardness. Low level savings slow down the accumulation of capital, which sets back the entrepreneurial spirit, thus the average incomes also remain at a low level, which in turn keeps discouraging the willingness to invest. It follows obviously from backwardness that changing the sign of the negative impacts may be greatly promoted by objectives aimed at creating and maintaining viable enterprises.

b) Taking *healthcare and social objectives* into account in regional strategies is not new. Nearly 30 years ago Nordhaus and Tobin made an attempt at doing so when they created the Net Economic Welfare (NEW) index. On the basis of this index it is possible to obtain a more realistic picture of the situation of the region, to set the welfare priorities more clearly, because in addition to an increase in material goods, it takes human factors into consideration as well. The majority of experts examine increasing employment and handling unemployment in a context of macro-economy, although they have an extremely significant impact on health. A range of analyses have proved the mentally and physically detrimental effects of being forced out of the sphere of active wage earners. The causal relation between unemployment and mortality rate, between the lack of employment and long-term psychiatric treatment is being more and more recognised. There is a close correlation between the 'state of health' of the economy of a region and the physical and mental state of the people living there, as proved by a series of Hungarian and international statistics (Bakó, 1996).

c) *Education and cultural objectives*. Analysing the relations between economic development and the psychic climate of the region can look back only on a past of a few years. The empirical studies conducted in the past years (primarily in the industrial crisis zones, e.g. in the Ruhr region) prove clearly that economic growth cannot be conceived without improving the standards of education and culture. Within that the following have particular significance: the R+D network; the vocational training and higher education network; the institutional network connecting leisure and the development of innovation skills. It can be unambiguously verified that the deterioration of economic indices is a result and not a cause of the former. Therefore education and cultural objectives have priority roles among the regional development objectives today.

d) *Sustainability objectives*. Among the welfare priorities, the objectives connected to the utilisation of resources taking into consideration the conservation of environmental values and assets and ecological interests play increasingly greater roles. The new schools of growth theory starting in the 1980s set the necessity of a moderate and protective approach to the natural environment and finite resources into the focal point of their systems of objectives. Therefore instead of the flow-type indices (GDP), stock-type indices taking the state of natural resources also into consideration came into the foreground.

e) *Demographic objectives*. The relations between the indices of the age pyramid and the net economic welfare (NEW) and the econometric studies have drawn attention to the

following: the long-term decrease in the number of live births since 1986 in the backward regions shows a difference of closely the same percentage as that of the economic potential; a similar relation can be shown between the age pyramid and net economic welfare. In what are called ageing regions (particularly in cases where the contraction point of the age pyramid can be taken to be in the age group 20-25 years) a secular economic decline is to be expected; a decrease in net economic welfare generally results in rapid contra-selection, then after the emigration of those with qualifications the mobility of the population decreases to a minimum and economic neuralgia is matched by demographic neuralgia.

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NEW OPPORTUNITIES FOR ENHANCING SELF-EMPLOYABILITY - DEVELOPING ENTREPRENEURIAL SKILLS VIA INTERNATIONAL VIRTUAL PROGRAMS (THE RESULTS OF CROSS BORDER VIRTUAL ENTREPRENEURSHIP PILOT-PROGRAMS IN HUNGARY)

There is an increasing emphasis in many countries, including Hungary, on developing new models of partnership between universities and enterprises and developing entrepreneurial skills as well. The economic significance of SME's has been continuously increasing since 1989, the political changes in Hungary. Supporting this sector and improving its development is highlighted objective of European Union, and the Hungarian economic policy as well. There is an increasing demand for rapid, dynamic and flexible teaching programs. Faculty of Economics has developed several teaching materials in international programs since 1996. The aim of the newest programs is to develop entrepreneurial skills.

Увеличивающийся акцент во многих странах мира, включая и Венгрию тоже, заключается в развитии новых моделей партнёрства между университетами и предприятиями и развитием предпринимательских навыков. С 1989 экономическое значение малых- и средних предприятий непрерывно увеличивается. Поддержка этого сектора и улучшение его развития выдвинуты на первый план в Европейском Союзе, и в Венгрии тоже. Есть увеличивающееся требование на быстрые, динамические и гибкие обучающие программы. В развитии этих программ с 1996 года участвует и Экономический Факультет Мишкольцкого Университета. Самая новая программа помогает развить предпринимательские навыки.

The economic significance of SME's has been continuously increasing since 1989, the political changes in Hungary. Supporting this sector and improving its development is highlighted objective of European Union, and the Hungarian economic policy as well. There is a great interest for relevant statistical data and analyses about the existing numbers, efficiency and competitiveness of SME's. Small and medium-sized enterprises (SMEs) are a very heterogeneous group of businesses